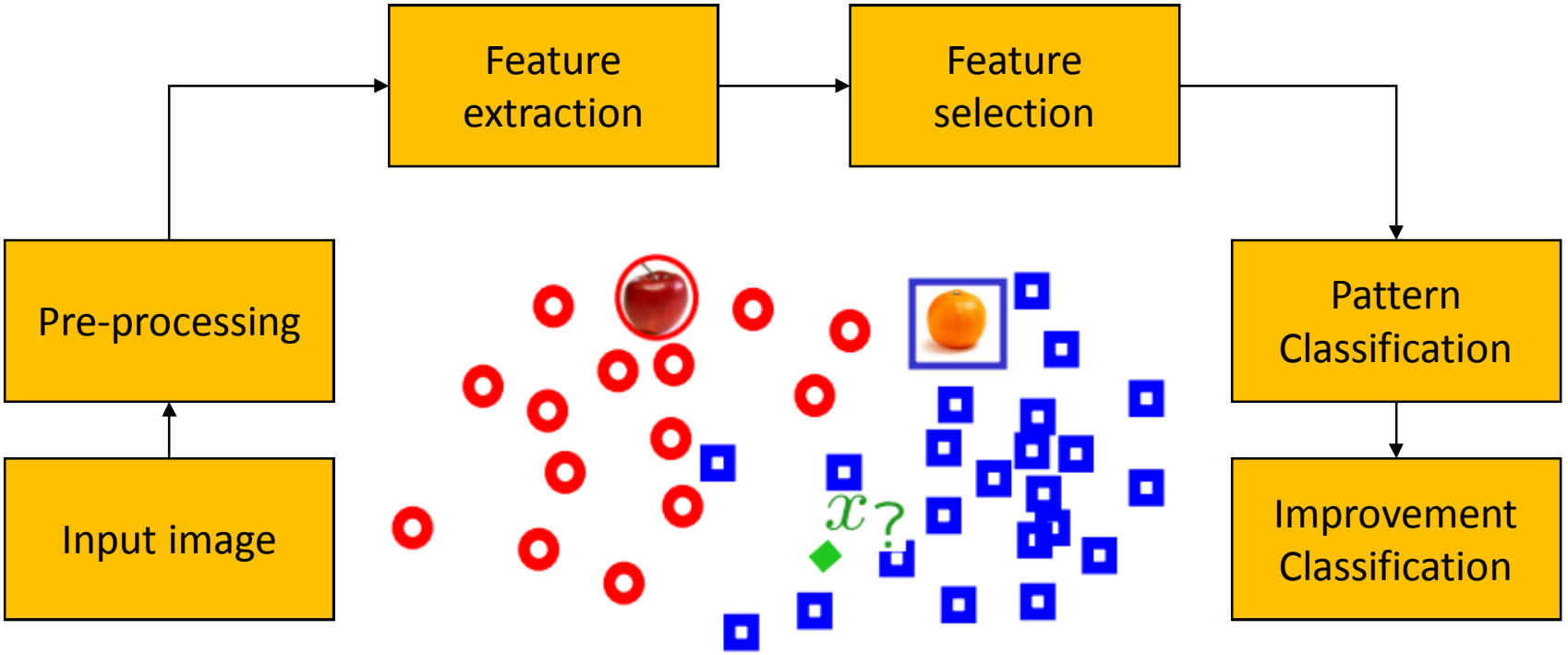
Mahidol University *Wisdom of the Land*

Chapter 13

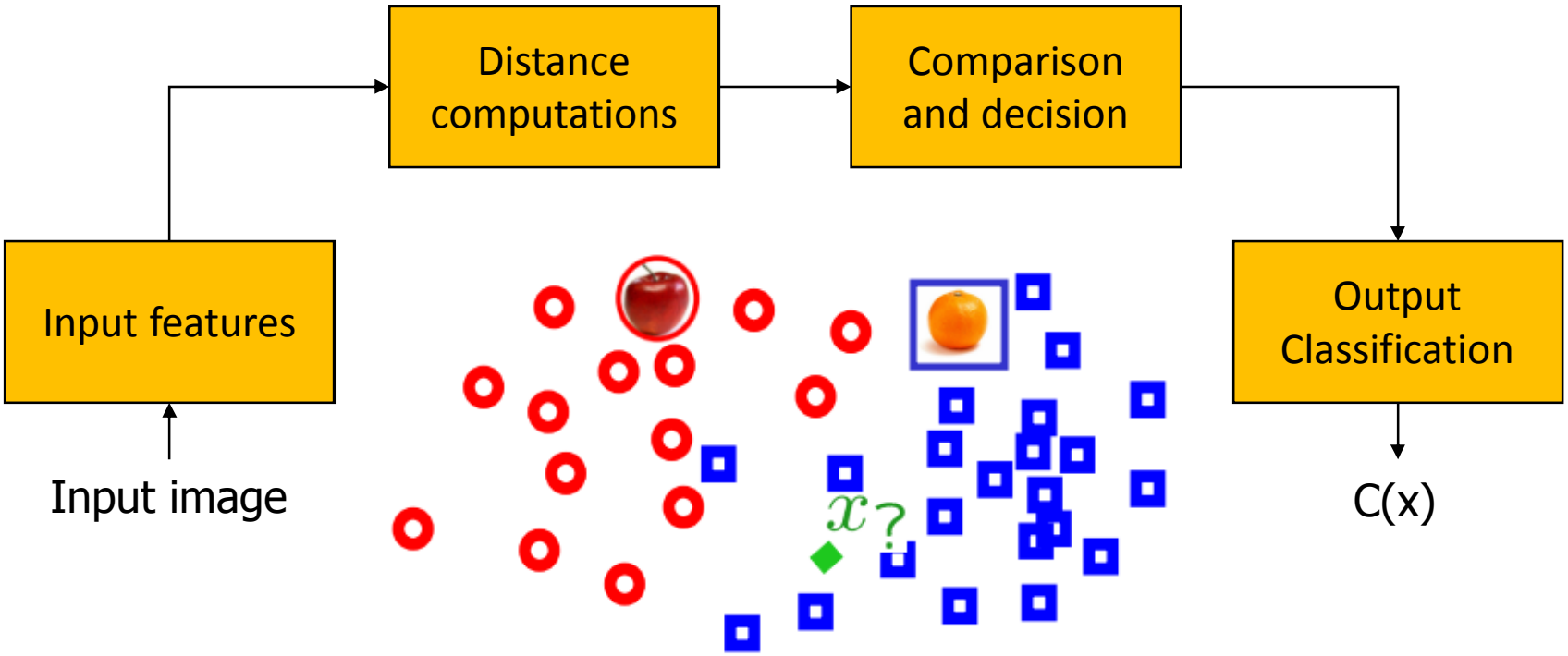
Practical pattern classification

Basic steps for Pattern classification



- The purpose of pattern classification methods is to assign a class to an unknown pattern based on previously acquired knowledge about image properties.

Basic steps for Pattern classification



- A statistical pattern classifier processes numerical information from the features, computes a series of distances, and uses those results to make decisions regarding which class label C(x) should be assigned to each input pattern x.

Pattern classification

- Pattern classification methods are assigned a class to each image based on a numerical representation of the image properties that is most suitable for the problem cases.
- Each class can be represented as a feature extractions and make decisions on which class to assign to a certain pattern based on distance calculations (or similarity measures).

Patterns and pattern classes

- A pattern can be represented as an arrangement of features and descriptors.
- A class is a set of patterns that share some the common image properties.
- An ideal class is one in which its members are very similar to one another and yet significantly different from members of other classes.
- For example, the class has high intra-class similarity. At the same time, inter-class differences are significant.

Patterns and pattern classes

- Data preprocessing
  - Noise removal: data samples that deviate too far from the average value for a class are removed that there may have been a mistake while measuring.
  - Normalization: feature extractions may need to be normalized before distance calculations (or similarity measures) take place.

Training and test sets

- To development pattern classification algorithms, the dataset can be divided in two groups:
  - Training set is used for algorithm development (fine-tuning).
  - Test set is used to evaluate the algorithm's performance.
- The reason of having two separate sets, training set and test set, is to avoid bias in reporting the success rates of the propose.
- The training set is contained a small representative sub-sample of the dataset (usually 20%), selected manually or automatically.

Implementation of the visual pattern classifier

1. Define the problem.
2. Determine the number of classes involved.
3. Extract features that are most suitable to describe the images and allow the classifier to label them accordingly.
4. Select a classification method.
5. Select a dataset.
6. Select a subset of images and use them to train the classifier.
7. Test the classifier.
8. Refine and improve the solution.

Thanks for your attention